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Processing of Pepper and Pepper Products WORKSHOP AT CFTRI

veral recommendations to boost the pepper economy in member countries were made at a workshop on Processing Pepper and Pepper Products, hosted by the Central Food Technological Research Institute (CFTRI), Mysore, 23-24 May 1981, in conjunction with the fifth meeting of the International Pepper Community (IPC) Permanent Panel on Techno-economic Studies. The workshop called for an expansion of export market for pepper through increased productivity; an improvement in the quality of pepper and pepper products, by adoption of improved processing techniques and implementation of quality standards; export of value-added products rather than of raw materials; and a search for non-food uses of pepper.

Held at the instance of IPC, the workshop was attended by delegates from Malaysia, Indonesia and India, IPC's Executive Director, a UNIDO representative, scientists from R&D institutions, exporters, and representatives of Indian industry and of export promotion organizations.

The need for updating the traditional techniques of processing of pepper on scientific lines to meet the stringent quality requirements of the importing countries was stressed both by the chairman of the Indian Spices Development Council, Shri H. B. Jagopal, in his inaugural address and the IPC's Executive Director, Shri L. Saklani, who presided over the inauguration of the workshop. Shri Jagopal suggested that the improved

system recently developed by CFTRI for cleaning, washing, drying, and grading of pepper should be popularized at small-, medium-, and large-scale levels to enable marketing of a uniform and high-quality pepper. He observed that since the external demand for black pepper at raw material stage rose by less than 3-4%, exporters must consider export of more processed products to obtain better returns and also exploitation of new markets.

Shri Saklani observed that producing countries had already been paying attention to processing of pepper, with a view to exporting value-added products and generating employment opportunities. It was time, he added, that they shared their know-how about research and product development in order to plan developmental activities in a proper perspective.

A large number of papers were presented and discussed in four sessions covering: primary processing, grading, industrial processing, non-food uses of pepper, market prospects of pepper and processed pepper products, and product diversification.

The deliberations revealed considerable scope for new uses of pepper, particularly in medicine, which had been well established since long. Also, its use as a pesticide, though in a preliminary research stage, was noteworthy. It is expected that more intensive research would be continued in these areas. The workshop noted with satisfaction the assurance given by the secretariat that it would do its best to promote non-food

uses of pepper in the interest of expansion and development of the pepper economy of member countries.

In order to sustain and expand the export market, the workshop stressed the need to improve the quality of black and white pepper, and of other pepper products.

To meet the market demand for uniform and high-quality pepper, it was recommended that the improved system of cleaning, washing, drying and grading of pepper, demonstrated by CFTRI, should be popularized at various scales of operation. Popularization of the blanching method of pre-treatment of green pepper was suggested for obtaining an attractive improved-quality, black pepper.

The workshop underlined the need for enhanced efforts to increase productivity of pepper by suitable agronomic practices. Propagation of better-yielding varieties in the member countries was suggested.

As a national policy, there was an urgent need to promote export of value-added products that may bring better returns to the grower, the workshop felt.

Market support to manufacturers who use graded pepper for making pepper powder, and strengthening of

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the activities of the quality-certifying agencies, were recommended.

Attention was focused on the need for rationalization of specifications/standards among the producing countries, particularly for exports. This had to be based on physical, chemical and microbiological data on pepper, to be collected from producing countries.

Intensive studies on container shipment of pepper may be carried out for optimizing conditions for storage and transport. Investigations need to be stepped up on packaging of pepper and pepper products, and results on materials and methods of packing made available to member countries.

The need for development of suitable storage structures for storage of pepper at farm level, exporters' level and during shipment was stressed.

The workshop recommended research in: (i) even ripening of pepper berries; (ii) flavour quality with respect to oil and pungency constituents of pepper; (iii) microbiological quality control of pepper; (iv) development of ready-to-use formulations from oleoresins for use in home-made food preparations; and (v) non-food uses of pepper and pepper products.

The need was felt for basic studies on pepper and its active ingredients with regard to physiological and pharmacological aspects. Investigations on aspects like insect repellent, and pesticidal, germicidal and fungicidal properties of pepper and its constituents were also suggested.

It was recommended that information on the medicinal uses of pepper as is available in other traditional systems of medicines in the region should be brought together in the form of a compendium, which should serve as a guideline to research scientists.

Also held along with the workshop was an exhibition of pepper and pepper products. A pilot process plant recently developed by CFTRI for cleaning, washing and grading of black pepper was demonstrated to the participants.

An annotated bibliography on Pepper and Pepper Products (1970-80)

and a souvenir containing some of the papers presented at the workshop were brought out by CFTRI □

International Pepper Community Meeting: CFTRI

The fixation of a minimum export price for pepper in order to provide a reasonable economic return to the farmer, an issue which had eluded the International Pepper Community (IPC) in the past four meetings, was a major recommendation arrived at in the fifth meeting of IPC's Permanent Panel on Techno-economic Studies. The meeting, organized by IPC Secretariat and hosted by the Central Food Technological Research Institute (CFTRI), Mysore, was held at the institute from 18 to 22 May 1981 and attended by nine nominated experts, a UNIDO representative and other participants from member countries, viz. India, Indonesia, and Malaysia.

The meeting decided that all member countries should export their pepper on a common sales contract form; an expert was nominated from one of the member countries to formulate a common sales contract for the pepper trade.

A comprehensive programme is envisaged for pepper production with more incentive to help poor farmers to increase production and productivity. Subsidies for fertilizers and planting materials, and financial and technical assistance were strongly recommended.

Adoption of a common customs nomenclature among member countries was suggested by the meeting. Also recommended was that processed pepper products industry, while in its infancy, should be provided strong government backing through reduction of duties on solvents and taxes to the extent of offsetting the possibility of double taxation.

The problem of *Phytophthora* infection (foot rot disease) in pepper received special attention. Following the identification by IPC of the major problem caused by the disease, it was decided to launch a joint programme

with international agencies by co-ordinating ongoing research in different countries.

Experts identified nine high-yield varieties from three member countries for inter-country trials by exchange of cultivars.

The meeting also recommended that IPC should prepare a monograph on pepper for distribution to producers.

IICB Celebrates Silver Jubilee

The Indian Institute of Chemical Biology, till recently known as Indian Institute of Experimental Medicine, Calcutta, celebrated its silver jubilee on 15 April 1981. The function was inaugurated by Prof. S. Nurul Hasan, Vice President of CSIR, and presided over by Dr S. Varadarajan, Chairman of Indian Drugs & Pharmaceutical Limited, and President of Indian Academy of Sciences.

Welcoming the visitors, IICB Director Prof. B. K. Bachhawat said that the institute, as it began, was established by men of research who had laid down for the institute the objective of seeking solutions to the contemporary medical and biological problems of the country. The objective he said, was retained even today although the laboratory had changed its name several times. Prof. Bachhawat pointed out that the institute's researches on kala-azar and phage typing of cholera had won national and international recognition. He visualized that the results of the recent investigations on residue utilization and location of alternative plant sources of steroid intermediates would be of significance to the growth of biological and pharmaceutical industries.

In his inaugural speech, Prof. Nurul Hasan stressed the importance of modern biology and biotechnology at the present time. He was happy that the culture of interdisciplinary research was being developed in IICB. Commending the efforts of the laboratory towards achieving its goals, the CSIR Vice

resident emphasized that while scientific excellence must be attained, the social responsibility of science should be recognized. Science must be promoted to serve mankind—to mitigate poverty, backwardness and superstition, he added.

Presiding over the meeting, Dr Radarajan pointed out that IICB had developed a sufficiently wide base to grow in a multidisciplinary way and that within CSIR had the opportunity to develop packages for technology transfer. In the light of the present-day problems, he placed special emphasis on areas like reproductive biology, endocrinology, nutrition, parasitology, and biotechnology, including fermentation technology, which he hoped ICM would pursue vigorously. He then

presented a silver jubilee souvenir to Prof. Nural Hasan.

Special silver jubilee awards were given to former Directors Dr J. C. Ray (posthumously), Dr H. Ghosh (posthumously), Dr S. H. Zaidi, Prof. R. B. Arora, and Prof. R. N. Chakravarti. Dr S. M. Mukherjee was given a special award for his contribution to the development of cholera phage typing.

Silver jubilee awards were given to the present members of staff with 25 years of service with the institute. Besides, those currently serving IICB with 25 years of service with CSIR were given special awards. Token awards were also made to several other members of staff who had made significant contributions to the growth of the institute. □

control of pollution arising from the practice of the existing coal technologies.

The function at CMRS, Dhanbad, was presided over by Shri S. Sankaran, Deputy Director General of Mines Safety, who in his address stated: "Environment finds no national boundaries and therefore there is need to attack the problem on an international scale". He sounded a note of warning that unless proper precautions were taken, India would in the twenty-first century face problems of crop failure, increase in air temperature, and damage to human health. The ill-effects of air pollution in the Jharia coalfield since mid-seventies due to intensive mining were mentioned by one of CMRS' scientists.

At PID's celebration, the chief guest Dr S. Z. Qasim, Secretary, Department of Environment, outlined the objective of the United Nations Environment Programme as 'the improvement of the quality of human life while at the same time trying to keep up a balance with the other components of life on land and sea—that is, to bring about a balance in the ecosystem. Referring to the newly created Department of Environment, Dr Qasim said that it was meant to be a 'think-tank' and a watch-dog for environment and its preservation. Describing environment as the biggest wealth of any nation, he pleaded that people should be made aware of their heritage of natural resources like the land, the sea, the rivers, the forests, and the fauna and flora and made to learn to conserve them. Again referring to the programmes of his department, the Secretary said that eco-development camps involving 20,000 youth of the country had been set up and that these camps would be engaged in vast tree planting programmes and in organizing seminars and workshops. Stating that senseless deforestation had taken place because of unplanned development of various hydroelectric projects, Dr Qasim called for a correct appraisal of how much deforestation was necessary for such projects. He also mentioned

CSIR Celebrates World Environment Day

Many of the CSIR laboratories in general, and the Industrial Toxicology Research Centre, Central Fuel Research Institute, Central Mining Research Station and Publications & Information Directorate in particular, celebrated 'World Environment Day': 5 June.

At ITRC, Lucknow, the celebrations were inaugurated by Shri P. R. Vyas Bhawan, Chairman of Uttar Pradesh Jal Vigam, who, in his address, emphasized the need for the development of appropriate technology and suitable legislation to check pollution at all levels. A highlight of ITRC's celebration was a symposium on the focal theme 'Development without Destruction'. Therein speakers dealt with such topics as effect of environmental pollutants on mental health; hazards of water pollution and ways and means of combating the pollution; environmental pollution in rural communities and measures taken recently to prevent it; and methods of treating factory effluents to prevent pollution of the atmosphere.

Also organized at ITRC was a poster contest for children on the theme 'our environment'.

At CFRI, Dhanbad, attention was

focused on pollution problems arising from growing power generation schemes based on coal. Following a scientific discussion of the problem the participants suggested a number of measures to mitigate pollution hazards. They felt an urgent necessity for establishing low-temperature carbonization plants in the various states of the country to meet at least the solid fuel requirements of urban and semi-urban areas. This measure, it was felt, would reduce if not eliminate the felling of wood. Furthermore, this step would alone contribute to a great extent to the lessening of atmospheric pollution, besides to better weather conditions, lessening of soil erosion, of flood havoc, etc.

The participants called for the adoption of the coal preparation practice to lessen the extraneous dust before it is utilized for combustion as also the adoption of fluid bed combustion technology, which is well known for its reduced emission of particulate and obnoxious air pollutants. An important recommendation that emerged from the discussion was that a research cell should be set up at CFRI to deal with the prevention and

that conservation and improvement of environment could not be the sole responsibility of any single government department or a few dedicated individuals: "It is the moral duty and responsibility of every citizen to do his best to preserve the environment and to this end people should be educated at all levels", added Dr Qasim.

To mark the occasion, the chief guest planted a sapling of Chinese palm (*Livistona chinensis*) in the PID/INSDOC campus. Dr Qasim also complimented PID for its excellent publications, especially those dealing with marine sciences and natural resources. □

Influence of Degree of Refining of Lubricating Oil Base Stocks on Additive Response

In order to meet the increasing requirements in lubrication engineering, lubricants containing different types of additive are formulated to obtain optimum performance. With this objective in view, Shri Himmat Singh of the Indian Institute of Petroleum, Dehra Dun, carried out a systematic study of the additive response on a series of 22 base oils of different degrees of refining and viscosity ranges, prepared from low- and high-sulphur crudes, representing a wide cross-section of chemical nature.

The base oils were characterized for detailed physico-chemical characteristics as well as for hydrocarbon types. Chemical changes occurring with the improvement in the degree of refining of base oils were followed by IR spectroscopy. The average molecular parameters (structural) were determined by NMR spectroscopy.

Saturate hydrocarbon components (% N + P) of the base oil are primarily responsible for their Viscosity Index (VI). Theoretically calculated % N + P was found to be linearly related to the experimentally determined % saturates by adsorption chromatography. The two most significant correlations obtained were between the VI of the base oils and their aromaticity, and

between VI and average number of carbon atoms per alkyl substituent, both determined by NMR spectroscopy. The first correlation was linear, while the second was a progressively flattening curve. This latter correlation helps define 'degree of refining' of base oil quantitatively.

Additive response studies were restricted to (i) flow properties and viscosity behaviour, and (ii) frictional and wear (tribological) behaviour.

For studying the first aspect, three VI improvers and two pour-point depressants were investigated covering the main types used in the formulation of lubricants. The appraisal of VI improvers' response in different base oils (of varying viscosity and degree of refining) was made on the basis of thickening effect at high temperature and viscosity temperature (VI) behaviour. This led to the conclusion that VI improvers are more effective in raising the VI level of light viscosity stocks and become progressively less effective with the increase in viscosity, i.e. from spindle through heavy viscosity. Maximum gain in VI was shown with the lower initial concentration of additives. Further, clay-finished base oils gave better overall additive response.

Studies on the pour depression aspects of base oils with commercially used Paraflow and Plexol type depressants have shown that the effectiveness of depressants improves with the degree of refining of base oil and it is maximum in the light viscosity spindle stocks; thereafter it decreases with increasing viscosity of base oil, the minimum being with heavy-viscosity clay-finished stock. Better pour-depressant response with improvement in degree of refining has been attributed to the increased amount of crystalline paraffin wax and absence of anti-pour depressant bodies like asphaltic and resinous materials in the refined base stocks. The poor effect of depressants in base oils of heavy viscosity series is due to (i) a large increase of viscosity of the oil at low temperatures on which the pour

depressant has no action; and (ii) a large amount of aromatics and other pour inhibiting bodies which compete with the additive for surface adsorption on wax crystals.

Tribological behaviour was investigated for a number of systems using a 4-ball wear tester. The rubber surfaces were examined through the scanning electron microscope for the type of surface damage, mode of action of lubricant, and influence of additive. The results obtained show that pure paraffins both iso- and normal (C_{11} to C_{38}) have better performance as lubricants in comparison to aromatics alone; but their presence in blends brings about a marked reduction in wear scar dia due to synergistic effect brought about by the relative ease with which they chemisorb on metal surfaces. The chromatographically separate oil fractions (saturates and mono aromatics) showed superior lubricant performance in comparison to the parent base oil, possibly due to their being free from non-hydrocarbon impurities and condensed-ring aromatics. Low-sulphur naphthenic base oils showed better lubricity than highly refined paraffinic base oils.

The additive response studies with inter-neutral base oil series from high-sulphur crude showed that the effectiveness of the lubricity additive oleic acid (OA) and tricresyl phosphate (TCP), and extreme pressure (EP) additive, generally improved with the degree of refining of base oil. The OA functions through film formation by adsorption on the metal surface and is highly temperature sensitive while TCP is believed to perform through the formation of metal phosphate on the surface.

The improved response of the latter with degree of refining is the result of reduction in concentration of non-hydrocarbon impurities and polynuclear aromatics, both of which are known to compete with EP/anti-wear additives for the rubbing surfaces.

Shri Singh has been awarded Ph.D. degree (1981) by the Meerut University for his thesis based on the studies. □

Manufacture of Burnt Clay Puzzolana and Lime-Burnt Clay Puzzolana Mixture in NEC Region

CRRI's Feasibility Study

The Central Road Research Institute (CRRI), New Delhi, undertook investigations, on the request of the North Eastern Council (NEC), Shillong, to prepare a preliminary feasibility report on the possibility of manufacture of burnt clay puzzolana (BCP) and lime-burnt clay puzzolana mixture (LBCPM) cement-saving and alternative cementing materials respectively, exploiting local material resources in the region. Based on the studies, and analysis of cost and other economic data, it has been considered feasible to establish 6 factories at: Bakulia (Karbi Anglong Distt) in Assam, Sohrarim (hasi Hills) and Nangwal-Bibra (Garo Hills) in Meghalaya, Kumarghat in Tripura, Dimapur in Nagaland, and Imphal in Manipur. Suitable deposits of clay and limestones are available within economic distance in all these cases.

The institute surveyed the five states in the NEC region in association with the regional office of the Geological Survey of India and state geological departments and collected samples of clay from 39 deposits and limestone from 10 quarries in the region for detailed studies in the laboratory to determine the quality of BCP and LBCPM resulting therefrom. The clays were calcined at different temperatures to establish the optimum calcination temperature in each case for maximum activity of the resulting BCP. Different feasible BCP and lime combinations were investigated upon to study the quality of the resultant BCPM.

These materials have special significance for the region, which has only two cement factories at Bokajan and Tengrapunjee. Apart from savings in cement through the use of these alternative materials, there would be economy in expenditure.

CRRI pioneered work on the development, manufacture and use of

these materials in the country in the early sixties, as a result of which two processes of manufacture were patented and Indian standards on the quality of such products for use in civil engineering works formulated. □

Criteria for Change of Engine Oils

The Indian Institute of Petroleum (IIP), Dehra Dun, has brought out the proceedings of the above workshop which it organized in collaboration with R&D centre of the Indian Oil Corporation Ltd on 13-14 November 1980 at Dehra Dun.

The publication (priced at Rs 125) covers the papers presented, discussions held and recommendations made at the workshop and is expected to serve as a guide in optimizing the drain intervals of crank-case oils. It can be obtained from: The Head, Coordination & Information Division, IIP, Dehra Dun 248005. □

PROGRESS REPORTS

RRL-Jammu Annual Report: 1979

The Regional Research Laboratory, Jammu, has acquired, over the last few years, capability in delivering to its clientele turn-key projects, especially those relating to the production of steroids. This is revealed in its annual report for 1979 published recently. Following the successful completion, the previous year, of a turn-key project for manufacture of menthol for Burma's Central Research Organisation, the Jammu laboratory was setting up in that country a plant for the production of diosgenin and progesterone. The laboratory also took up three more turn-key projects relating to (i) manufacture of steroids for Tamil Nadu government; (ii) manufacture of diosgenin (capacity, 1500 kg raw material/batch) for West Bengal government; (iii) fabrication of an electrical kiln for drying hops for Himachal Pradesh and Jammu & Kashmir governments (the kiln has already been installed in Keylong, H.P.).

A comprehensive project report for setting up a plant to process 1 tonne/batch (or 300 tonnes/annum) of borax to produce boric acid was prepared for J&K Minerals Ltd. Technical know-how for the production of boric acid from borax had been developed earlier by the laboratory.

Based on its technology for the manufacture of disproportionated rosin and hydrogenated rosin from gum rosin, the laboratory provided to the sponsor, Prabhat Terpenes & Synthetic Pvt. Ltd, Jammu, a complete project report for setting up a plant to produce 600 tonnes/annum of disproportionated rosin and 300 tonnes/annum of hydrogenated rosin.

The process for the production of citric acid was transferred to Andhra Citrates Ltd, who would be installing a factory at Hyderabad. Meanwhile, the citric acid producing strain of *Aspergillus niger* was being maintained in the laboratory. Investigations were also under way on the direct utilization of a hydrocarbons mixture (C₁₃-C₁₇ units), a byproduct of petroleum refineries, for citric acid production; yields of 55-60% citric acid had been obtained.

Of the progress of projects on hand in applied botany, mention may be made of the development of a new variety of *Ocimum gratissimum* (named Clocimum) the oil of which is clove-scented. The essential oil of this variety is comparable to clove oil in terms of eugenol, its main constituent. Large quantities of the polycross seed were developed for large-scale cultivation in Jammu district.

Large-scale multiplication of *Dioscorea composita* was continued; more than 5000 plants with 3% diosgenin were raised from tuber cuttings by adopting the techniques developed earlier by the laboratory.

In the area of cellulose pulp and board, 10 projects were on hand. Important among them are: production of fibre boards from thermomechanical pine needle pulp, of suitcase boards from agro-industrial wastes, straw

lignin based resin for use in boards, roofing shingles from pine needles, vanillin from sawdust, utilization of *Parthenium* weed in production of straw and fibre boards.

While the technology for sulphuring and drying of apricots developed by the laboratory was catching up speedily in the Ladakh region, techniques were being standardized for drying of other fruits and vegetables of commercial importance, as for instance, *Punica granatum*. Among the other successful projects in the area of food technology are the development of (i) a milk-like beverage from a soyabean variety of Kashmir Valley, comparable to cow's milk in nutritive value, and (ii) a formulation for bleaching in-shell walnuts, which is more efficient than the conventional chemical treatment; and standardization of a process for preservation of sugar-cane juice.

In the area of fur and wool technology, two projects were completed: (i) production of suedes from poor-quality sheepskins and (ii) of apparel-quality black suede from sheepskins. From locally available sheepskins fine-quality shearlings were produced. The possibility of utilizing these shearlings as bed pads, as is being done in USA, to prevent the incidence of decubitus ulcers was being investigated in collaboration with a local hospital.

A drug development programme which received considerable attention during the year was the large-scale production of vasicine. An economic process for the production of biologically active vasicine was being worked out. A new synthetic method was worked out for RLX, a potent bronchodilator and synthetic analogue of vasicine; the method gives about 40% yields.

Work on the process development for the production of pharmaceuticals like berberine hydrochloride and sulphate, solasodine, 17- α -methyltestosterone, testosterone, 16-DPA, and progesterone was completed.

A study of fundamental importance pursued by the laboratory relates to the

regulation of insect reproduction by non-toxic sterilants. □

Deputation Briefs

Shri S.G. Bhat, NEERI's Documentation Officer, completed an assignment with WHO IRC, The Netherlands, in the field of information support in water supply and sanitation. The assignment, lasting from 13 October to 21 November 1980, included preparation of programme material concerning planning and development of national information systems in water supply. From 11 to 13 November, he was consultant for the first regional workshop for POETRI (Programme on Exchange & Transfer of Information) for Latin American and Caribbean countries held at Lima, Peru. □

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Dr R.P. Sharma of the Regional Research Laboratory, Jorhat, visited the Federal Republic of Germany during 8 October-3 December 1980, under the CSIR-DAAD exchange of scientists programme and studied the applications of ^{13}C NMR spectroscopy to organic chemistry at the University of Siegen. He synthesized specifically labelled (1-D, 2-D & 3-D) pyridines and recorded their ^{13}C NMR spectra on a high-field (400 MHz) NMR spectrometer to determine the effect of deuterium on the carbon chemical shift. The novel observations made in this study will be useful in biosynthesis of natural products.

Dr Sharma also studied the dynamic behaviour of some naturally occurring compounds with potential anticancer activity by low temperature H and ^{13}C NMR spectroscopy. □

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Dr S.N. Ghatak of the Central Drug Research Institute, Lucknow, visited Federal Republic of Germany during November-December 1980, under the CSIR-DAAD exchange of scientists programme, to acquaint himself with the current trends of research on chemotherapy, immunology and biochemistry of human and animal

parasites with special reference to filaria. He worked at the Institut für Parasitologie, Giessen, and the Bernhard Nocht Institut, Hamburg. He also visited Tropenmedizinisches Institut, Tübingen, where work on culturing helminth parasites under *vitro* conditions is being carried out.

PERSONNEL NEWS

Dr A.G. Mathew:
Scientist in charge
RRL-Trivandrum

Dr A.G. Mathew has been appointed Scientist in charge of the Regional Research Laboratory (RRL) Trivandrum, with effect from 27 March 1981, consequent on Prof. P.L. Rohatgi's taking over as Director Regional Research Laboratory Bhopal.



Dr Mathew (born 2 Jan. 1938) obtained his M.Sc. (applied chemistry) and Ph.D. (food chemistry) degrees from the Kerala University. Joining the Central Food Technological Research Institute (CFTRI), Mysore, in January 1959, he specialized in the chemistry and technology of spices and plantation products. He moved over to the newly established Trivandrum laboratory in May 1976 and set up an effective research group in spices and plantation products. As coordinating scientist and later as head of the Food Division, he also helped build RRL Trivandrum.

Author of more than 60 research papers, he has also to his credit a few commercially successful processes. He

his group won the Indian Merchants' Chamber Award for 1974 development of a process for the production of spice oils and oleoresins. He was one of the recipients of NRDC Independence Day Award for 1979 for a process on dehydrated green pepper.

Dr Mathew and his colleagues have also won the prestigious Rafi Ahmed Kidwai Award for the biennium 1974-75 for their contributions to the chemistry and technology of spices.

Dr Mathew and his colleagues are responsible for the development of processes relating to fractionation of chili oleoresin, defatted coconut gratings, and dry-packed green pepper, all passed through NRDC; the first two have been purchased by private parties. He is also associated with the processes relating to tapioca flour with improved cooking characteristics, bottling of coconut water, and white pepper—all in advanced stages of development.

Dr Mathew taught M.Sc. courses in applied chemistry of the Kerala University during 1956-59, was a coordinator for the FAO-sponsored M.Sc. course in food technology conducted by CFTRI. He is also a recognized Ph.D. guide of Kerala and Mysore universities.

Dr Mathew is a member of the Kerala State Committee on Science and Technology. A member of the Association of Food Scientists and Technologists, India, he has served as its honorary executive secretary (1973-74) and as president of Trivandrum chapter (1978-80). He is also associated with a number of committees of the Indian Standards Institution. □

Appointments/Promotions

Shri V.S. Rama Raju

Shri V.S. Rama Raju of the National Institute of Oceanography's Cochin Regional Centre has been promoted on assessment as Scientist EI (1 July 1980). Shri Rama Raju (born 20 June 1932) obtained M.Sc. (geophysics—geology and oceanography) degree from the Andhra University in 1957.

Joining the newly started Oceanographic Research Wing of the Central Board of Geophysics (CGB) (which CSIR took over in 1961) in 1958, he was its Officer in charge till 1963. He was associated with International Indian Ocean Expedition during 1963-65.

Shri Rama Raju took part in several oceanographic cruises, including the 31st cruise of R.V. Vitiaz (USSR), in the Indian Ocean, on deputation, during 1958-60. Deputed to West Germany and Poland under the exchange programme of scientists during 1969-70 and 1977, he worked at the German Hydrographic Institute, Kiel University, and the Institute of Hydro Engineering, Gdansk, respectively.

As head of the Physical Oceanography Section of NIO's Cochin Regional Centre, he has specialized in the application of coastal oceanography to beach erosion, harbour development works and marine pollution. His interests include coastal currents and dynamics of estuaries. He is a nominated member of the Beach Erosion Board of Kerala. □

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Also promoted consequent upon five-year assessment at the National Institute of Oceanography, Dona Paula, are: Shri K.J. Peter (as Scientist C, 27 Sep. 1980); Shri N.M. Anand (as Scientist C, 8 March 1981); Dr V.T. Paulinose (as Scientist B, 24 Feb. 1981); Shri P.N. Aravindakshan (as Scientist B, 24 Feb. 1981); Smt. C.B. Lalithambika Devi (as Scientist B, 24 Feb. 1981); Smt. V.R. Nair (as Scientist B, 24 Feb. 1981); Shri V. Ramesh Babu (as Scientist A, 1 April 1981); Shri Kesava Das (as Scientist A, 1 April 1981); Shri S.N. Poi Fondevkar (as Scientist A, 1 April 1981); and Shri M.D. George (as Scientist A, 1 April 1981).

Appointments on promotion at NIO include those of: Dr A.K. Jain (as Scientist C, 4 April 1981); and Shri S.N. D'Souza (as Scientist B, 5 May 1981). Promoted, consequent upon assessment, at the National Botanical Research Institute, Lucknow, are: Shri

M.A. Kher (as Scientist C, 29 June 1979); Shri K.B. Saraswat (as Scientist BI, 2 Sep. 1978); Shri H.P. Srivastava (as Scientist BI, 29 Sep. 1979); and Shri S.P. Singh (as Scientist AI, 1 Nov. 1977). □

Corrigenda

In the 'appointments' at the National Chemical Laboratory, Pune, reported in *CN*, 31 (1981), 56, col. 2, the name of the Scientist B should be read as Dr S.N. Kshirsagar; also, the date of appointment on promotion of Dr A.S. Khanra as Scientist B is 31 October 1980.

In 'Patents Filed' vide *CN*, 31 (1981), 64, col. 3, the first patentee of Pat. 818/Del/80 should be read as M.V. Subba Rao.

Erratum

The title of the workshop vide *CN*, 31 (1981), 68, col. 3 is 'Ocean Futures'. The error is regretted.

ANNOUNCEMENTS

Structural Composites & Concrete Technology

An advanced course on Structural Composites and Concrete Technology will be conducted by the Structural Engineering Research Centre (SERC), Madras, from 12 to 23 October 1981.

The course is open to senior engineers and research scientists of leading consulting and construction firms, industries in the public and private sectors, and academic and research institutions.

The course will cover: Performance and design criteria; Ferrocement; Fibre-reinforced cement composites; Polymer concrete composites, including polymer impregnated concrete, resin concrete, and latex cement concrete; Wood, gypsum and sulphur-based structural composites; State-of-the-art of concrete technology; Advances in concrete technology, such as superplasticized concrete, high-strength concrete, and light-weight and aerated concretes; Fibre-reinforced plastics in construction; New research techniques; Application technology and potential—important case studies; and Preventive

and curative repair to structures using composites.

It is also proposed to hold an exhibition in which industries which are active in the development and application of structural composites could exchange information with the participants.

Further details regarding registration, etc. may be obtained from: Dr B.V. Subrahmanyam, Course Coordinator, Structural Engineering Research Centre, CSIR Campus, Adyar, Madras 600 020. □

International School on Materials for Energy

To honour Dr A.R. Verma, Director, National Physical Laboratory, New Delhi, on his sixtieth birthday, an International School on Synthesis, Crystal Growth and Characterization of Materials for Energy Conversion and Storage is being held at NPL from 12 to 23 October 1981. The school is sponsored by CSIR (NPL), International Union of Crystallography, Indian National Science Academy, Department of Science and Technology, University of Delhi, Banaras Hindu University, and University Grants Commission.

Eminent scientists from India and abroad will deliver special invited lectures.

Further information on the school may be obtained from Dr Krishan Lal, Director of the School, NPL, Hillside Road, New Delhi 110012. □

PATENTS FILED

222/Del/81: Improvements in or relating to the chemical stripping solution for nickel-iron alloy deposits from brass, copper and steel substrates, B.A. Shenoi, (Mrs) M. Pushpavananam, (Mrs) V. Raman & (Mrs) S. Jayakrishnan—CECRI, Karaikudi.

232/Del/81: A process for preparation of tetra-N-butylammonium iodide, Arvind Kumar, K.P. Agarwal, & A.C. Roy—CDRI, Lucknow.

OBITUARY

Dr P.S. Rao

Dr Palur Srinivasa Rao of the Central Salt & Marine Chemicals Research Institute, Bhavnagar, passed away on 26 May 1981. Joining CSMCRI in 1961, he rose to the position of Scientist E in 1976. Dr Rao had done extensive research on seaweeds and marine algae and published about 45 research and review papers. He had visited Japan, Italy, Sweden, UK and FRG in connection with his research interests and was member, among other learned societies, of Japanese Phycological Society and Aquacultural Research Association of Japan. Dr Rao had chaired one of the technical sessions of the Tenth International Seaweed Symposium (Göteborg, Sweden, 1980). □

Shri K.G. Subramanyam

Shri K.G. Subramanyam of the Central Leather Research Institute, Madras, passed away on 18 June 1981. He was editor of 'CLRI Home Journal' and was also engaged in public relations work. Shri Subramanyam, who joined the Publications & Information Directorate, New Delhi, in 1956, moved over to CLRI's regional liaison office at Madras in 1960. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

ADVERTISEMENT NO. 20/81

It is proposed to appoint a Scientist F for the Central Salt & Marine Chemicals Research Institute, Bhavnagar, where R&D work carried out is spread over the following main areas: salt; marine and inorganic chemicals; desalination; marine algae; sea-water irrigulture; and solar energy utilization.

The prospective candidate should possess high academic qualifications in mechanical engineering or chemical engineering. He should have an established reputation of excellence in research and development and possess management capability of a high order.

He will be expected to provide leadership in process and engineering research and development in the area of desalination, specifically in reverse osmosis/ultra filtration and electrodialysis with an eventual view of research results finding

industrial applications. A knowledge of system analysis and experience of engineering design be an added advantage. He should preferably be below 50 years in age but the age limit can be relaxed in deserving cases.

The salary scale is Rs 2000-125/2-2500 plus allowances at Central Government rates. His initial pay can also be considered. This is a contractual appointment for a period of six years. The incumbent can also be confirmed. The conditions of contract will be supplied on request.

Scientists/technologists interested may obtain two copies of the standard proforma for sending their *curriculum vitae* from the Director (Administration), Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110001. They can also obtain a brochure on the aims and objects and the latest annual report of the institute. Completed *curriculum vitae* proforma should be received in this office on or before 18 September 1981.

ADVERTISEMENT NO. 23/81

The Council proposes to appoint a Director for the National Physical Laboratory, New Delhi. This is a large institution with facilities for research in physics, and research, design and development work in physics-oriented technologies. It also functions as the national bureau of standards.

The prospective Director should be a physicist of high repute, possess high academic qualifications in physics or applied physics and should be capable of providing scientific leadership of a high order; he should have high managerial capabilities and should be able to enthuse young colleagues. He should have specialized preference in one or more of the following areas in which the laboratory is presently working:

Materials research, radio science, cryogenics and superconductivity, vacuum and high-pressure technology, carbon technology, and measurements of physical standards.

These areas are illustrative only and other areas of specialization in physics are not ruled out. The Council will expect and encourage the Director to initiate and promote work in emerging/frontier areas of physics.

He should be preferably below 50 years but the age limit can be relaxed in deserving cases.

The post carries a scale of Rs 2500-125/2-3000 plus allowances as per Central Government rules. A higher start can be given. Subsidized housing is available in the campus. This is a contractual appointment for six years with a two-year period of probation. The contract is renewable and the incumbent can also be confirmed in the post.

Those interested may send their *curriculum vitae* on or before 18 September 1981 to the Director (Administration), Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110001, who will also provide on request an annual report and a brochure setting out the aims and objectives of NPL, New Delhi.